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Harry Harlan Exercise

Instructor's Copy

Behavioral Research Aspects of Safety and Health Group (BRASH)
Institute for Mining and Minerals Research (IMMR)
University of Kentucky, Lexington, Kentucky

August 1987

This latent image exercise was developed and field tested under U. S. Bureau of Mines research Contract No. HO348040. Information about the design and characteristics of the exercise and the field test results are available in the project technical reports filed with the Bureau of Mines Research Center in Pittsburgh, PA. This is one of more than 30 exercises designed for use in annual refresher training to teach and test critical skills for coping with mine emergency situations. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or recommendations of the Interior Department's Bureau of Mines or the U. S. Government.

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Appendices

- Appendix A: Problem booklet (duplicate this copy for use in class)
- Appendix B: Answer sheet blank (print the latent image answers on this)
- Appendix C: Latent image answers (print these on the answer sheet)

Introduction

This document contains most of the materials needed to use the exercise. The main part of the document is the instructor's copy. It tells how to use the exercise, presents the objectives, the master answer sheet, the scoring key, and discussion notes to be used following the exercise. The next section summarizes results from field tests of the exercise, and reports the miners' evaluation of the activity. The last part of this document is three appendices. Appendix A is the exercise problem booklet. This booklet can be duplicated locally. The booklets are reusable. One is needed for every person in the classroom. Appendix B is the answer sheet and the trainee's questionnaire. Copies of this answer sheet must have the latent image (invisible) ink answers that appear in Appendix C printed on them.[1] Answer sheets are consumable. One is needed for each person or each small group of persons who work the exercise.

Exercise Summary

Read this section first. It determines if the exercise is appropriate for your classes. If you choose to use the exercise, examine the table of contents and review the remainder of this document.

Type: Latent Image

Length: Six questions (20 minutes for administration plus 25 for discussion)

Skills: First aid
Conducting a primary and secondary survey
Treating a crushed chest injury and shock

Location: Underground

Problem: You are the continuous miner operator. You hear your helper cry out. When you stop the machine, you find Harry lying on the floor near the miner tail boom. A shuttle car operator says he saw Harry get pinned to the mine roof by the tail boom. You and the other miners on the section must figure out how to care for Harry and take him out of the mine or he may die.

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[1] You can do this yourself if you have the proper equipment, or you may wish to purchase copies of preprinted latent image answer sheets from the University of Kentucky, IMMR, 234 Mining and Minerals Resources Building, Lexington, KY 40506-0205, (606) 257-8683, or the National Mine Health and Safety Academy, P.O. Box 1166, Beckley, WV 25802-1166, (304) 255-0451.

HOW TO USE THIS EXERCISE

1. Look at the performance objectives. Decide if the exercise is relevant for your annual refresher class.

2. Work through the exercise with the special pen and score your responses.

3. Read the master answer sheet for the exercise. Look at all the answers.

4. Read the "Instructor's Discussion Notes" for the exercise.

5. Become thoroughly familiar with the problem so that you can present it to your class without reading it. Put the maps or illustrations on an overhead projector so you can use these to help explain the problem.

6. When you present the exercise to the class:

   - Explain that the answers from class members will be used to improve the exercise in the future.

   - Give each person an exercise booklet, an answer sheet and a pen.

   - Demonstrate how to select and mark answers using the special pen.

   - Go over the instructions for doing the exercise with the whole group.

   - Explain the problem making sure everyone understands the problem situation.

   - Have the class members work the exercise.

   - When the class members finish, have them figure up their score using the instructions at the end of the exercise.

   - When everyone has finished, discuss the exercise. Let class members discuss the merits of each answer. Add your own ideas. Then have each person fill out the Trainee's Questionnaire attached to the answer sheet.

   - After class look over the completed trainee's questionnaires and the answer sheets. This information may provide ideas for improving the exercise for future classes. Write out your ideas for improving the exercise and send them to the following address.

IMMR/BRASH
201 Porter Building, University of Kentucky
Lexington, Kentucky 40506-0205 ph. (606) 257-3796

Performance Objectives for Harry Harlan Exercise

Objective number	Capability verb(s)	Description of required performance and conditions under which it is to occur
1 FA*	Recall Apply	The elements of the primary and secondary surveys given a list of options for action
2 FA	Recall Apply	The rules that victims with suspected spinal injury should not be encouraged to sit or stand and must be immobilized before being moved (unless an emergency situation requires movement to save life)
3 FA	Recall Select	Critical methods of immobilizing and moving a victim with a possible spinal injury, given a list of options
4 FA	Evaluate	A hypothetical patient for the presence of spinal fracture, crushed chest, and shock given a list of the victim's signs and symptoms
5 FA	Choose Judge	From among alternative actions effective means of evaluating and treating an equipment injury victim given a written accident scenario

*Skill and knowledge domain abbreviation:
FA = first aid

Master Answer Sheet for Harry Harlan Exercise

Use this answer sheet to mark your selections. Rub the special pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need.

Question A (Choose only ONE answer unless you are directed to "Try again!")

1. [Harry may need immediate help. Try again!]
2. [Correct! This will tell you if Harry needs immediate help. Do next question.]
3. [This could cause further injury. Try again!]
4. [There are only two of you. Both may be needed to care for Harry. Try again!]

Question B (Select as MANY as you think are correct.)

5. [This could cause further injury.]
6. [Correct! You see his belly move and you can feel air move at his mouth.]
7. [Correct! No bleeding is seen.]
8. [Correct! Harry is moaning and swearing quietly.]
9. [Correct! A rapid pulse is present.]

Question C (Select as MANY as you think are correct.)

10. [Correct!]
11. [Correct! It is important to begin the mine emergency procedures.]
12. [This could cause further injury.]
13. [This could cause further injury.]
14. [This may cause further injury.]

Question D (Select as MANY as you think are correct.)

15. [Correct! He says "OK", but there is no movement.]
16. [Correct! He says he feels numb.]

Question D (continued)

17. [Correct! Pulse 120 and weak.]

18. [Correct! He appears pale.]

19. [No! This could cause further injury.]

20. [Correct! Stomach area feels normal.]

21. [Correct! His lower neck spine feels deformed.]

22. [Correct! No abnormalities are seen.]

23. [Correct! Part of his left chest draws in when he inhales and moves easily]
[when you apply gentle pressure.]

Question E (Select as MANY as you think are correct.)

24. [Correct! This is done.]

25. [Correct! This is done.]

26. [This could cause further injuries.]

27. [Correct! This is done.]

28. [This could cause further injuries.]

Question F (Select as MANY as you think are correct.)

29. [Correct! This is done.]
[ ]

30. [Correct! This is done.]

31. [It is almost impossible to lift a victim lying on his side and keep the head and]
[neck immobilized in a straight line. This could cause further injury.]

32. [Correct! This is done.]

33. [His head and neck should be immobilized first to prevent spinal injury.]

Finding your score

Number of "Correct" answers you colored in = (1) _____

12 minus number of incorrect answers you colored in = (2) _____

Add blanks one and two to get your total score = (3) _____

Highest possible score = 33

Lowest possible score = 0

TRAINEE'S QUESTIONNAIRE

1) name of exercise _____

2) your age _____ 3) your sex _____ M _____ F 4) years underground coal miner _____

5) your job title _____

Check all the areas in which you have special training, certification, and/or that you routinely perform.

		Special Training	Certification	Routinely Perform
6)	Mine Foreman	_____	_____	_____
7)	Mine Safety Committee	_____	_____	_____
8)	Mine rescue	_____	_____	_____
9)	CPR	_____	_____	_____
10)	Advanced first aid	_____	_____	_____
11)	EMT	_____	_____	_____
12)	Advanced life support	_____	_____	_____
13)	Other (describe) _____	_____	_____	_____

Think about the exercise you just finished. Circle the number which tells how much you agree or disagree with the following statements.

		Definitely Yes			Definitely No
14)	This problem could happen in real life.	4	3	2	1
15)	This exercise will help me remember something important if I am ever in a similar situation.	4	3	2	1
16)	I learned something new from the exercise.	4	3	2	1
17)	The exercise took too long to complete.	4	3	2	1
18)	I liked working the exercise.	4	3	2	1
19)	The instructor's directions were clear.	4	3	2	1
20)	The written directions in the exercise were easy to understand.	4	3	2	1
21)	The diagrams, charts, and pictures were easy to understand.	4	3	2	1
22)	The scoring procedures were easy to understand.	4	3	2	1
23)	The exercise was easy to read.	4	3	2	1

If you have anything more to say about the exercise, please write on the back of this page. Thank you.

Instructor's Discussion Notes for Harry Harlan Exercise

Use the information presented here and in the problem book, your own ideas and experience, and those of the miners in your class to discuss the exercise after it is completed. Group discussion can help strengthen knowledge and skills, correct errors, and relate the exercise content to the experiences of the miners. After they have worked the exercise, miners enjoy discussing the problem. They also frequently think of better ways to respond to a problem than those listed among the answers. The purpose of the exercise is to help miners think about and remember basic knowledge and skills they may someday need to deal with a mine emergency. The discussion following the exercise can contribute to this goal and tailor the exercise content to the needs of the group.

It is helpful to show overhead transparencies of the master answer sheet during the discussion. This allows you to lead the group through the exercise and to disclose and discuss all the answers to each question. Most of the information about why particular answers are correct or incorrect is given on the master answer sheet.

The following notes are intended to provide additional information for you as you discuss the exercise with your class. Read through and think about the notes before the class. Don't read the notes to the class members. This would be boring and ineffective. Rather, incorporate the ideas you find here with your own ideas and make these points at the appropriate place in the discussion of the exercise.

Question A - The correct answer is 2. Assuming the accident scene is safe, first aid intervention begins with an examination of the victim. This is done in order to prevent further injuries and prioritize treatments. Since the mechanism of this particular accident suggests the possibility of a spinal injury, the victim should not be unnecessarily moved.

Question B - The correct answers are 6, 7, 8, and 9. The examination begins with the "primary survey." The flesh of the upper shoulder and neck (trapezius muscle) is pinched and a phrase like "Are you OK?" is shouted as a check for consciousness. If a neck spine injury is suspected, and breathing is absent, an airway is obtained using a "jaw thrust" maneuver. At this point the first-aider looks, listens and feels for breathing, and checks for the presence of a carotid pulse. If the victim does not require immediate rescue breathing or CPR, he or she should be checked for significant bleeding before proceeding.

Question C - The correct answers are 10 and 11. If the victim does not require immediate first aid during the primary survey, a secondary survey should be initiated to define his or her needs. Since the nature of this particular accident suggests a severe injury, steps should be taken to secure EMT help at the earliest opportunity.

Question D - The correct answers are 15, 16, 17, 18, 20, 21, 22, and 23. When a neck spine injury is possible, the secondary survey should begin with the question "Where

does it hurt?" since, according to neurosurgeon, Martin H. Weiss, (Emergency Medicine, April 15, 1984) the conscious victim will always exhibit pain at the point of injury even though he or she may have loss of sensation below that point. Even if the victim is disoriented, signs of pain will be elicited by gently touching the point of injury. If pain is present or if the victim is unconscious as the result of trauma, the head and neck must be immobilized before continuing with the examination.

Once the head and neck are immobilized, and pulse and breathing rates are determined, the survey proceeds in a head to toe manner.

Question E - The correct answers are 24, 25, and 27. The secondary survey has revealed signs of a neck spine injury, crushed chest, and shock which are treated in turn by immobilization, a bulky dressing, and covering the victim with a blanket. Throughout these procedures special care should be taken so that the victim is not moved unnecessarily keeping in mind that as many as 25% of the neck spine injuries that result in permanent damage are caused by improper handling on the part of care givers (Emergency Medicine, April 15, 1984).

Question F - The correct answers are 29, 30, and 32. If a rigid cervical collar is available it should be placed before moving the victim. If no collar is available, and the victim is in a side lying position, preparation for transport is as follows: Place a padded side board beside the injured. Straighten the victims limbs and log roll the victim onto the board using a four person technique, with the most experienced person holding the injured person's head. The head and neck must be kept in alignment with the body at all times. (See Figures 2 and 3.) If a blanket roll splint and cravats are being used, they may now be placed while gentle traction is applied to the head. The cravats are now tied as indicated in Figure 4. If available, sandbags and adhesive tape used in a similar manner are a superior method of immobilization for the head and neck. Finally the victim is strapped to the board, working from the head to the chest and down to the legs.

Figure 3: Log rolling the victim - first position

Figure 4: Log rolling the victim - final position

Figure 5: Immobilization of the head and neck with blanket roll and cravats

References

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Mine Health and Safety Administration. (1980). First aid book. Washington, DC: U. S. Department of Labor (pp. 6, 99, 152).

National Conference on Cardiopulmonary Resuscitation and Emergency Care. (1986). Standards and guidelines for cardiopulmonary resuscitation (CPR) and emergency cardiac care (ECC) Part II: Adult basic life support. Journal of the American Medical Association 255 (21), 2915-2932.

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Weiss, M. H. (1984). The injured patients' injured neck. Emergency Medicine, pp. 24-48.

Scoring Key for Harry Harlan Exercise

Question A

1. __W__
2. __R__
3. __W__
4. __W__

Question B

5. __W__
6. __R__
7. __R__
8. __R__
9. __R__

Question C

10. __R__
11. __R__
12. __W__
13. __W__
14. __W__

Question D

15. __R__
16. __R__
17. __R__
18. __R__

Question D (con't)

19. __W__
20. __R__
21. __R__
22. __R__
23. __R__

Question E

24. __R__
25. __R__
26. __W__
27. __R__
28. __W__

Question F

29. __R__
30. __R__
31. __W__
32. __R__
33. __W__

Summary of Field Test Results

The Harry Harlan Exercise (HRL) underwent three rounds of field testing, including authentication and field tests one and two. The authentication consisted of a small initial field test that produced too little data for meaningful statistical summaries, but many comments, criticism, and suggestions that were used to revise and improve the exercise before the first formal field test. The formal field tests involved carefully controlled administration of the revised exercise to groups of miners at multiple sites. Each field test resulted in data used to revise and improve the exercise prior to the next field test of the new version. Tables that summarize the results of the field tests for both HRL1and HRL2 are attached. The version of the exercise included in this document includes all of the cumulative revisions made as a result of the three rounds of field tests.

HRL1 was tested with 126 miners, in 2 classes, at 6 sites. HRL2 was field tested with 39 miners, in 1 class, at 1 site. One set of tables is attached for the field test results of HRL1 and another similar set for HRL2. Each set of tables is divided into two parts. The first part describes the people who participated in the field test and their evaluation of the exercise. The second part describes the measurement properties of the exercise.

Sample characteristics and miners' evaluations

Tables 1 through 3 describe demographic characteristics of the sample. Table 4 indicates the number of persons in the sample who reported either some training, special certification, and/or routine performance of the eight areas listed as rows in the table. Inspection of these tables quickly reveals the numbers and types of persons involved in the field test of the exercise.

Table 5 reports the miners' judgment of the exercise quality and worth. Each person was asked to rate the value of the exercise on each of ten qualities. By checking a number on a scale, miners indicated to what extent the exercise displayed each quality. Inspection of the values in Table 5 reveals the percentage of miners who reported that the exercise 1) was realistic, 2) helped them to remember important things, 3) helped them learn something new, 4) was too long, 5) was enjoyable, 6) instructor's directions were clear, 7) written directions were clear, 8) illustrations and maps were clear, 9) scoring procedures were easy to understand, and 10) was easy to read. Earlier versions of this evaluation scale had only two categories, a "yes" and a "no." Later versions of this scale had a four point rating system with a 4 being a "definitely yes" and a 1 being a "definitely no." This is why Table 5 is somewhat different for HRL1 and HRL2.

Psychometric properties

The next set of tables describe the psychometric (mental performance measurement) properties of the exercise. Table 6 presents summary data for each of the exercise questions, including the minimum, maximum, median, and mean question scores

observed in the sample; the standard deviation and skewness of each question score; the squared correlation coefficient of each individual question score with the exercise total score; and the estimated reliability of the total exercise score if that particular question were dropped from the test. The last line in Table 6 reports the same information for the total exercise score. This is obtained by summing question scores across the whole exercise. Each question is weighted such that a perfect score on each question sums to 100 for the exercise total score. Inspection of the table quickly presents the basic performance data for the sample.

The weighting of each question score to produce a total score of 100 is designed to allow comparison of the difficulty of different versions of the same exercise, or different exercises, even though these often have different numbers of questions. The total score of 100 is also a common convention for reporting test scores.

Table 7 reports the number of answers (options) to questions that discriminated properly between persons with high scores on the test and those persons with low scores. Tests that have multiple choice answers to questions must include some incorrect and some correct answers. The person who takes the test must choose among correct and incorrect answers (distractors) to each question. Persons who get a high total score on the test know more about the test content than persons who get low scores. Therefore, when data are aggregated from the whole sample of persons who took the test, wrong answers (distractors) to each question on the test should be significantly negatively correlated with the overall test score, and correct answers to questions should be significantly positively correlated with the exercise total score. When correct answers and wrong answers (distractors) behave this way, the answer (whether correct or incorrect) is said to positively discriminate between persons who know much about the content and those who know little. However, when persons who get high scores on the total test tend to pick wrong answers (distractors) more frequently than persons who get low scores, the answer is said to reverse or negatively discriminate. The opposite case is also true. That is, when persons who get low scores on the total test score tend to pick a right answer to a question more frequently than persons who had high total test scores, that answer is also said to reverse or negatively discriminate. The discrimination values are used to identify and correct problems in the answers for questions. To be valid, the method requires an adequate sample of persons who exhibit a wide range of variability in their total test scores.

Table 7 reports the frequency with which answers to questions behaved in this desirable way. The table tells the percentage of answers to questions on the test that discriminated positively, negatively, or not at all among the ability levels represented in the field test sample.

Another way to look at the discrimination capability of a test is to divide the sample into groups of persons with greater or lesser levels of expertise. Table 8 reports the degree to which the exercise total score discriminated between persons in the sample with different levels of self-reported expertise. For example, Tables 8 shows that both the HRL1 and HRL2 exercises did discriminate significantly between those persons who reported they had some special training, certification, and/or routinely performed

advanced first aid training. The means and standard deviations for these two groups are given as well as the F ratio and the p value.

Finally, the last table is another discrimination analysis for the total exercise score, this time between the self-reported major job categories represented in the sample. The category "miners" includes all working miners who are not supervisors, surveyors, engineers, etc. The "maintenance/technical" category includes all inspectors, engineers, surveyors, electricians, mechanics, and other technical and maintenance personnel who work in the mines and typically have special skills, and who move from section to section as they complete their work. The "supervisory/management" category includes all managers from the mine section foreman on up. The "other" category includes all other persons such as preparation plant and surface mine workers, personnel, office staff, and others who are not miners but who often participate in annual refresher training classes.

The number of miners reported in the tables varies. This is because not all miners answered all of the questions on the trainee's questionnaire. Also, some of the data received from the field tests reflect individual performances, while other data reflect small group performance. Instructors often had the miners work the exercise in small groups. This is a good instructional procedure that miners enjoy. However, the psychometric studies require individual exercise administration in order to carry out the discrimination analyses. Therefore, Tables 1 through 5 report the actual or valid percent of persons who responded to specific items on the trainee's questionnaire. The remainder of the psychometric tables report data for the number of persons who properly completed the exercise individually.

Characteristics of the HRL Exercise

The exercise is sound. It was field tested on a sufficiently broad and varied sample to produce robust empirical data. Miners who completed the exercise judged it very favorably. The exercise does discriminate between those with advanced and basic levels of training in first aid. The HRL2 version of the exercise also discriminates between individuals in different job categories. The mean score on HRL1 was 80.5 with a standard deviation of 9.64. For HRL2 the comparable values were 81.5 and 10.86. Although the exercise is moderately easy for most miners, a number of miners make errors in critical skills that should be learned to perfection. Miners and trainers report the exercise is useful in teaching and reinforcing these critical skills.

Characteristics of the field test sample for HRL1 Exercise

(2 sites, 6 classes, n = 126)

Table 1: Age and experience of miners (years)

	n	mode	mean	s.d.
age	101	34	35.6	9.09
experience	96	8	9.9	6.61

Table 2: Gender distribution (%)

	n	frequency %
female	7	6.8
male	96	93.2

Table 3: Job classification

	n	frequency %
miner	58	59.2
maintenance/technical	19	19.4
supervisory/management	19	19.4
other	2	2.0

Table 4: Self-reported level of expertise (frequency %)

category	training	certification	performance
foreman	13.5	18.8	11.5
mine safety committee	0.0	1.0	3.1
mine rescue	5.2	2.1	2.1
CPR	20.8	17.7	14.6
advanced first aid	15.6	10.4	1.0
EMT	5.2	5.2	3.1
advanced life support	3.1	0.0	1.0
other	2.1	1.0	0.0

Table 5: Miners' rating of exercise validity, relevance, quality, and utility

content	yes	no
problem could happen	100.0	0.0
help remember important things	96.9	3.1
learned something new	91.8	8.2
exercise too long	10.2	89.8
liked working the exercise	93.8	6.2
instructor's directions clear	92.8	7.2
written exercise directions clear	84.5	15.5
graphics easy to understand	96.8	3.2
scoring easy to understand	86.5	13.5
exercise easy to read	97.9	2.1

Psychometric properties of HRL1 Exercise

(printout date 7/17/87, 2 sites, 4 classes, n = 66)

Table 6: Question score and total score statistics

question	minimum score*	maximum score*	median	mean	s.d.	skewness	R^2_{QT}	alpha if question deleted
A	0.0	16.7	16.7	16.0	2.67	-4.63	0.15	0.41
B	3.3	16.7	13.3	13.0	3.80	-0.75	0.24	0.16
C	4.2	16.7	16.7	14.9	2.64	-1.60	0.05	0.44
D	3.7	16.7	11.1	11.7	3.99	-0.36	0.24	0.14
E	4.2	16.7	12.5	12.5	3.19	-0.43	0.15	0.31
F	6.7	16.7	13.3	12.5	2.70	-0.39	0.12	0.51
Total	55.6	96.7	81.7	80.5	9.64	-0.72	(alpha = 0.32)	

*The values reported are the minimum and maximum scores observed, for this sample. The lowest possible score = 0.0 and the highest possible score =16.7. When scores are summed across questions the highest possible score = 100 and the lowest possible score = 0.

Table 7: Proportion of answers discriminating positively, negatively, and not at all with exercise total score ($p<.10$)

positive	negative	no relationship
24/31 (77.4%)	1/31 (3.2%)	6/31 (19.4%)

Table 8: Discrimination between basic and advanced levels of first aid training

	n	mean	s.d.	F ratio	p value
basic	41	79.0	10.23	4.75	0.033
advanced	23	84.2	6.57		

Table 9: Discrimination between job categories

	n	mean	s.d.	F ratio	p value
miner	34	79.9	9.82	0.80	0.498
main/tech	14	82.1	6.21		
super/mgt	11	84.4	10.58		
other	1	76.1	0.00		

Characteristics of the field test sample for HRL2 Exercise

(1 site, 1 class, n = 39)

Table 1: Age and experience of miners (years)

	n	mode	mean	s.d.
age	37	23	29.0	5.6
experience	35	9	7.7	3.8

Table 2: Gender distribution (%)

	n	frequency %
female	1	2.6
male	37	97.4

Table 3: Job classification

	n	frequency %
miner	20	55.6
maintenance/technical	11	30.6
supervisory/management	5	13.9
other	0	0.0

Table 4: Self-reported level of expertise (frequency %)

category	training	certification	performance
foreman	0.0	20.5	5.1
mine safety committee	0.0	0.0	0.0
mine rescue	5.1	5.1	2.6
CPR	10.3	12.8	7.7
advanced first aid	7.7	10.3	7.7
EMT	10.3	12.8	7.7
advanced life support	0.0	0.0	0.0
other	0.0	0.0	0.0

Table 5: Miners' rating of exercise validity, relevance, quality, and utility

content	definitely yes			definitely no	mean	s.d.
	4	3	2	1		
problem could happen	86.8	7.9	5.3	0.0	3.8	0.51
help remember important things	73.0	16.2	8.1	2.7	3.6	0.76
learned something new	35.1	35.1	13.5	16.2	2.9	1.08
exercise too long	11.1	13.9	11.1	63.9	1.7	1.09
liked working the exercise	58.3	30.6	5.6	5.6	3.4	0.84
instructor's directions clear	73.7	21.1	0.0	5.3	3.6	0.75
written exercise directions clear	69.4	19.4	11.1	0.0	3.6	0.69
graphics easy to understand	83.8	13.5	2.7	0.0	3.8	0.46
scoring easy to understand	73.0	18.9	5.4	2.7	3.6	0.72
exercise easy to read	77.1	14.3	8.6	0.0	3.7	0.63

Psychometric properties of HRL2 Exercise

(printout date 4/27/87, 1 site, 1 class)

Table 6: Question score and total score statistics (n = 39)

question	minimum score*	maximum score*	median	mean	s.d.	skewness	R^2_{QT}	alpha if question deleted
A	5.6	16.7	16.7	16.1	2.13	-4.05	0.19	0.62
B	6.7	16.7	16.7	14.4	2.99	-1.19	0.37	0.46
C	6.7	16.7	13.3	13.1	3.67	-0.65	0.13	0.58
D	3.7	16.7	13.0	12.4	4.37	-0.62	0.37	0.45
E	6.7	16.7	13.3	13.0	2.94	-0.03	0.27	0.48
F	6.7	16.7	13.3	12.5	2.73	0.21	0.09	0.61
Total	57.0	96.7	83.0	81.5	10.86	-0.68	(alpha = 0.57)	

*The values reported are the minimum and maximum scores observed, for this sample. The lowest possible score = 0 and the highest possible score = 16.7. When scores are summed across questions the highest possible score = 100 and the lowest possible score = 0.

Table 7: Proportion of answers discriminating positively, negatively, and not at all with exercise total score ($p<.10$)

positive	negative	no relationship
22/33 (66.7%)	0/33 (0%)	11/33 (33%)

Table 8: Discrimination between basic and advanced levels of first aid training

	n	mean	s.d.	F ratio	p value
basic	34	79.8	10.24	8.40	0.006
advanced	5	93.6	6.96		

Questions that discriminate significantly at p<.10: D, p = .019; E, p = .012 and F, p = .053.

Table 9: Discrimination between job categories

	n	mean	s.d.	F ratio	p value
miner	20	76.3	11.26	9.04	0.001
main/tech	11	84.8	4.88		
super/mgt	5	94.2	2.82		
other	0				

Questions that discriminate significantly at p<.10: B, p = .028; D, p = .000 and E, p = .018.

Appendix A: Problem Booklet

Duplicate this copy of the problem booklet for use in your classes. Each person in your class should have a problem booklet while they are working the exercise. The problem booklets are reusable. To save effort and money, ask the trainees to avoid marking in the booklets and collect all the booklets after the class.

You may obtain copies of the problem booklet from the University of Kentucky or the National Mine Health and Safety Academy. The addresses and telephone numbers for these two agencies are listed in the footnote on page three of this document.

Harry Harlan Exercise

Problem Booklet

Behavioral Research Aspects of Safety
and Health Group (BRASH)
Institute for Mining and Minerals Research (IMMR)
University of Kentucky, Lexington, Kentucky[1]

August 1987

[1] This latent image exercise was developed and field tested under U. S. Bureau of Mines research Contract No. HO348040 with the Bureau of Mines Research Center in Pittsburgh, PA. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or recommendations of the Interior Department's Bureau of Mines or the U. S. Government.

Instructions

Read the problem described on the next page. Then answer the six questions. Do them one at a time. Don't jump ahead, but you may look back to earlier questions and your answers. Some questions direct you to choose only one answer unless you are told to "Try again!" Other questions tell you to select as many answers as you think are correct. Follow the directions for each question.

After you have selected your choice to a question, look up the number for that choice on the answer sheet. Rub the special pen between the brackets for that choice. A hidden message will appear that tells you if the choice is correct and provide you with additional information. When you finish you will learn how to score your performance.

Harry Harlan Exercise

Background

There are 8 entries being driven in 56 inch coal.

Eleven miners are on the section.

The portal is 20 minutes away by mantrip.

The mine phone is five minutes away.

You are the most experienced first aider on the section.

Problem

You are operating a continuous miner at the face. Your helper, Harry Harlan, is working behind you. When you raise the boom you hear Harry cry out. After shutting down the miner you run back to find him lying on the mine floor. Meanwhile the shuttle car operator runs up shouting that he saw Harry crushed against the roof. (See Figures 1 and 2.) Harry is lying on his right side.

Now turn to the first question and begin.

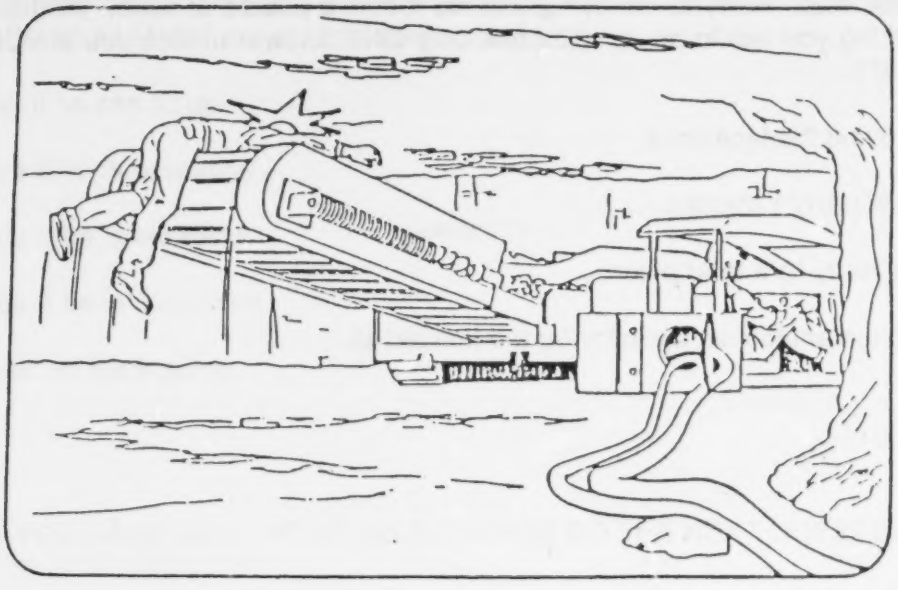

Figure 1: Harry crushed against roof by boom of continuous miner

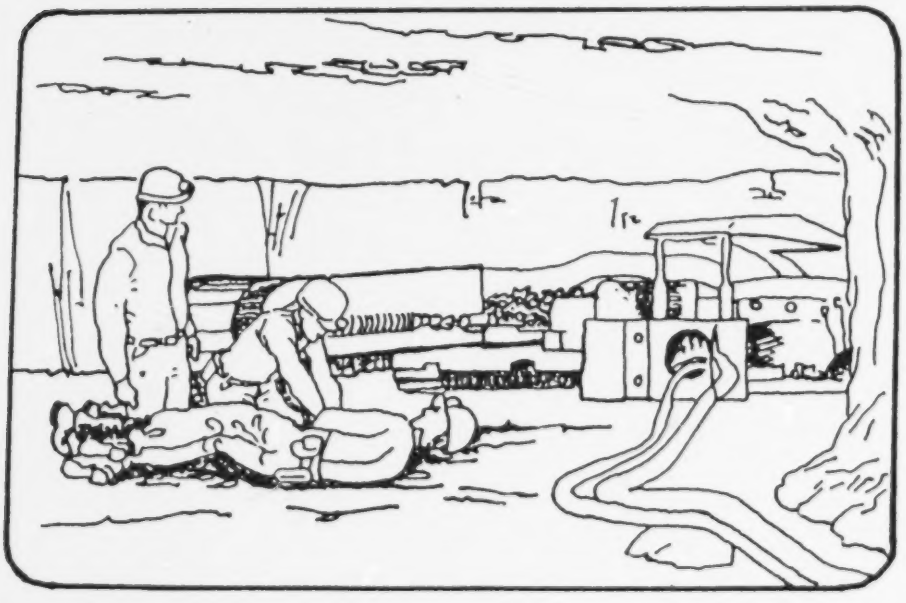

Figure 2: Harry lying injured on mine floor

Question A

You yell for help. Harry is now lying with his feet in a puddle of water. In this situation the first thing you would do is: (Choose only ONE answer unless you are directed to "Try again!")

1. Try to find the face boss.
2. Check Harry's injuries.
3. Drag Harry to a drier place.
4. Send the shuttle car operator for the first aid kit.

Question B

Harry is lying on his side and you are checking him for injuries. How would you do this? (Select as MANY as you think are correct.)

5. Ask if he can sit up.

6. See if he is breathing.

7. See if he is bleeding.

8. See if he is conscious.

9. Feel his neck pulse.

WHEN YOU HAVE MADE YOUR SELECTION(S) DO THE NEXT QUESTION.

Question C

Three miners who heard your shouts come to help. You have made your initial check of Harry's injuries. He is lying on his side and moaning softly. What should you do for him now? (Select as MANY as you think are correct.)

10. Continue checking Harry's injuries.

11. Send one miner to call outside for help.

12. Ask Harry to sit up if he can.

13. Tell your buddies to move Harry to the closest mantrip.

14. Roll Harry onto his back, prop his legs up about a foot, and cover him with your jacket.

WHEN YOU HAVE MADE YOUR SELECTION(S) DO THE NEXT QUESTION.

Question D

You continue to check Harry for injuries. How would you do this? (Select as MANY as you think are correct.)

15. Ask if he can wiggle his fingers and toes.
16. Ask if he is in pain.
17. Check his pulse rate.
18. Check his skin color.
19. Turn his head from side to side.
20. Gently feel his stomach area.
21. Gently feel his spine with your fingertips.
22. Look at his arms and legs.
23. Look at and apply gentle pressure to each side of his chest.

WHEN YOU HAVE MADE YOUR SELECTION(S) DO THE NEXT QUESTION.

Question E

As you finish your checks one of your buddies arrives with a first aid kit, two blankets, and a stretcher board. What would you do for Harry at this time? (Select as MANY as you think are correct.)

24. Cover him with the blanket.

25. Immobilize his head and neck with a blanket roll.

26. Turn him onto his back and prop up his legs.

27. Tape a bulky dressing over the injured area of the chest.

28. Prop up his head and shoulders with a blanket to help him breath easier.

WHEN YOU HAVE MADE YOUR SELECTION(S) DO THE NEXT QUESTION.

Question F

One of your buddies returns and says that it will take at least 20 minutes before EMTs can reach the scene. You decide to move Harry to the portal by mantrip. Which of the following methods would you use? (Select as MANY as you think are correct.)

29. Gently but firmly hold Harry's head with both hands to keep it in line with his neck and body while the other crew members lift him onto the stretcher. Then immobilize him on his back.
30. Cover Harry with a blanket.
31. Lift Harry onto the stretcher in the position he was found (lying on his side).
32. Secure the blanket roll splint with cravats at the forehead and chin.
33. When immobilizing Harry, begin with his feet and legs. Then work up to his abdomen, chest, neck and head.

END OF PROBLEM

Scoring your performance

1. Count up the total number of responses you colored in that were marked "correct." Write this number in the first blank on the answer sheet.
2. Count the total number of incorrect responses you colored in. Subtract this number from 12. Write the difference in the second blank on the answer sheet.
3. Add the numbers on the first and second blanks. This is your score.

The best possible score of 33 results from selecting all the correct answers and no wrong answers. The worst possible score of zero results from selecting all the wrong answers and no correct answers.

Appendix B: Answer Sheet Blanks

These are the answer sheet blanks. Copies of these blank answer sheets may be duplicated in the normal fashion. However, the answers that are found within the brackets must be printed on these blank answer sheets in latent image ink. These answers are found in Appendix C. If you have the capability to print latent image ink, make copies of the blank answer sheets. Then make a mimeograph master of the latent image answers that appear in Appendix C. Then print the invisible latent image ink on the blank answer sheets, being careful to make sure all pages print and that the appropriate answers line up with the appropriate blanks. The Master Answer Sheet in the first part of this document shows all the latent image answers in their proper place.

Most companies and trainers prefer to purchase preprinted answer sheets. You may obtain copies of preprinted latent image answer sheets from the University of Kentucky or the National Mine Health and Safety Academy. The addresses and telephone numbers for these two agencies are listed in the footnote on page 3 of this document. Instructions for printing your own latent image answer sheets are also available from these two agencies.

The exercise may be administered in small groups or individually. Used individually, you will need one answer sheet for each person in your class. If you use the exercise in small groups, you will need one answer sheet for each 3 to 5 persons in your class. The answer sheets are consumable. You will need a new set for each class.

Special latent image marking pens are also needed by each person who marks an answer sheet. These may be obtained from the University of Kentucky IMMR office or the National Mine Health and Safety Academy. The addresses and telephone numbers for these two agencies are listed in the footnote on page 3 of this document. You may also purchase latent image marking pens and latent image ink supplies from A. B. Dick Company, 5700 West Touhy Avenue, Chicago, Illinois 60648, (312) 763-1900. The A. B. Dick Chicago Office can put you in touch with the local supplier for your area.

Answer Sheet for Harry Harlan Exercise

Use this answer sheet to mark your selections. Rub the special pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need.

Question A (Choose only ONE answer unless you are directed to "Try again!")

1. [ ]
2. [ ]
3. [ ]
4. [ ]

Question B (Select as MANY as you think are correct.)

5. [ ]
6. [ ]
7. [ ]
8. [ ]
9. [ ]

Question C (Select as MANY as you think are correct.)

10. [ ]
11. [ ]
12. [ ]
13. [ ]
14. [ ]

Question D (Select as MANY as you think are correct.)

15. [ ]
16. [ ]

Question D (continued)

17. [ ]

18. [ ]

19. [ ]

20. [ ]

21. [ ]

22. [ ]

23. [ ]
[ ]

Question E (Select as MANY as you think are correct.)

24. [ ]

25. [ ]

26. [ ]

27. [ ]

28. [ ]

Question F (Select as MANY as you think are correct.)

29. [ ]
[ ]

30. [ ]

31. [ ]
[ ]

32. [ ]

33. [ ]

Finding your score

Number of "Correct" answers you colored in = (1) _____

12 minus number of incorrect answers you colored in = (2) _____

Add blanks one and two to get your total score = (3) _____

Highest possible score = 33

Lowest possible score = 0

TRAINEE'S QUESTIONNAIRE

1) name of exercise _____

2) your age _____ 3) your sex _____ M _____ F 4) years underground coal miner _____

5) your job title _____

Check all the areas in which you have special training, certification, and/or that you routinely perform.

	Special Training	Certification	Routinely Perform
6) Mine Foreman	_____	_____	_____
7) Mine Safety Committee	_____	_____	_____
8) Mine rescue	_____	_____	_____
9) CPR	_____	_____	_____
10) Advanced first aid	_____	_____	_____
11) EMT	_____	_____	_____
12) Advanced life support	_____	_____	_____
13) Other (describe) _____	_____	_____	_____

Think about the exercise you just finished. Circle the number which tells how much you agree or disagree with the following statements.

	Definitely Yes			Definitely No
14) This problem could happen in real life.	4	3	2	1
15) This exercise will help me remember something important if I am ever in a similar situation.	4	3	2	1
16) I learned something new from the exercise.	4	3	2	1
17) The exercise took too long to complete.	4	3	2	1
18) I liked working the exercise.	4	3	2	1
19) The instructor's directions were clear.	4	3	2	1
20) The written directions in the exercise were easy to understand.	4	3	2	1
21) The diagrams, charts, and pictures were easy to understand.	4	3	2	1
22) The scoring procedures were easy to understand.	4	3	2	1
23) The exercise was easy to read.	4	3	2	1

If you have anything more to say about the exercise, please write on the back of this page. Thank you.

Appendix C: Latent Image Answers

These pages contain the latent image answers that must be printed in the blanks of the answer sheet in Appendix B. These answers are spaced and sequenced correctly so that they exactly match up with the appropriate brackets on the answer sheet blank.

Once the latent image ink answers have been printed on the answer sheet blanks, the special developing pen reveals the formerly invisible (latent image) printed message.

You may purchase preprinted answer sheets or you may prepare your own copies. To learn more about this option, and to determine how many answer sheets and special pens you will need, see the introductory section for Appendix B.

Harry may need immediate help. Try again!

Correct! This will tell you if Harry needs immediate help. Do next question.

This could cause further injury. Try again!

There are only two of you. Both may be needed to care for Harry. Try again!

This could cause further injury.

Correct! You see his belly move and you can feel air move at his mouth.

Correct! No bleeding is seen.

Correct! Harry is moaning and swearing quietly.

Correct! A rapid pulse is present.

Correct!

Correct! It is important to begin the mine emergency procedures.

This could cause further injury.

This could cause further injury.

This may cause further injury.

Correct! He says "OK", but there is no movement.

Correct! He says he feels numb.

Correct! Pulse 120 and weak.

Correct! He appears pale.

No! This could cause further injury.

Correct! Stomach area feels normal.

Correct! His lower neck spine feels deformed.

Correct! No abnormalities are seen.

Correct! Part of his left chest draws in when he inhales and moves easily when you apply gentle pressure.

Correct! This is done.

Correct! This is done.

This could cause further injuries.

Correct! This is done.

This could cause further injuries.

Correct! This is done.

Correct! This is done.

It is almost impossible to lift a victim lying on his side and keep the head and neck immobilized in a straight line. This could cause further injury.

Correct! This is done.

His head and neck should be immobilized first to prevent spinal injury.